User's Guide

Tenma 72-10155 USB

PC Based Digital Oscilloscope

Operation Manual

www.tenma.com

Certificate of Product Warranty

This product's warranty, provided by our company, covers a period of 1 year from the date of purchase. All faulty parts and/or functions, resulting despite user's normal use, will be repaired and/or replaced at no charge during the warranty period.

However, if any of the malfunctions are caused by user carelessness, inadequate maintenance, or natural disaster, we will the provide repair and/or replacement services for a fee regardless of warranty period.

In the event our product does not prove suitable for your application you can return the product for an exchange or refund. To claim, the product must be returned in good condition within 14 days. Before returning a product, please contact and provide us a serial number. The customer is responsible for all shipping costs.

Products covered by this warranty are limited to those that are registered at the headquarter or branch offices and repairs, replacements, or refunds will be issued according to manufacturer's discretion. When product is in need of warranty services, the purchaser may contact the distributor with the product or send the product with a detailed description of services required via postal service to the distributor or sales offices (the purchaser will be responsible for packaging, postage, and any postal insurance). Once repair services are completed or product is replaced, the supplier will return the refurbished or new product to the purchaser (return postage will be paid by the supplier).

However, if we determined required services to be outside the boundaries of the warranty coverage, we will first contact the purchaser and provide an estimate of repair costs and obtain authorization to conduct services before any work is done. In such a case, return postage along with the repair costs will be billed to the purchaser when the repaired product is returned.

We do not warrant that the software and the product with which it was supplied are completely error free or that will function correctly in all operating environments. It is essential that the users should verify that the software and product are functioning to your requirements before relying on them or the data that they generate. We do not accept responsibility for any loss or injury caused by the use of the product or software. It is the user's responsibility to ensure that the product is suitable for the user's application.

We will not be held legally for any malfunction resulting from user carelessness, abnormal use, and/or natural disaster. Even if we are in receipt of prior notification of such dangers, we will not be held legally liable.

Product Warranty Guide

Please read through the "Precautions for Safety" carefully to ensure a long life and safe use of this product.

This product has been processed through careful quality control and testing procedures. Any malfunctions occurring during normal use are covered under the guidelines of the "Certificate of Product Warranty", which is included in this manual.

If you experience product malfunction, please contact the distributor of this product.

Precautions for Safety

The following instructions are provided for safe and correct use of the product and to prevent a potentially dangerous situation or damage. Be sure to read through the entire manual before using the product.

Recommended Usage Environment

- The ambient temperature and relative humidity should be 32°-104°F (0-40℃) and 10-80% respectively for the normal operation of the product.

Power Source

- The USB terminal and 72-10155 USB are connected via a USB cable for DC +5V power from the PC. The product does not require an outside power source.

  Warning: Be careful not to input excessive power voltage.

- The product's input power capacity is fixed as shown below to prevent electric shock and/or fire. Please do not use voltage higher than that prescribed below.

  (Warning) Be sure to check the probe attenuation before measuring the voltage. The voltage that is higher than the maximum input voltage can cause damage to the device and user. There is the risk of an electric shock when measuring

high voltage. The user needs to pay extra attention not to have their hand or other exposed skin or conductive material touch the terminal.

- Please remove all unused probes or test leads in the test area so that they do not come in contact with surrounding high voltage parts.
- Make sure that the PC's power source is grounded.

Handling Precautions

- The probe ground lead is at ground potential. Do not connect the ground lead to an elevated voltage. Connect the ground lead of the probe to earth ground only.
  If measuring the floating potential, we will recommend taking the measurement by the differential motion method using CH1 and CH2.
- Do not connect or disconnect the product with the probe or test lead while it is connected to a voltage source.
- Do not attempt to operate the product in any situation that a risk of dysfunction or shock could be expected.
- Stop using the product immediately when you notice something unusual; such as abnormal smells, smoke or sounds.
  If you noticed anything unusual, also immediately remove the USB connection from your computer.
- Keep the product out of the reach of children or those untrained or who cannot be trusted with the use.
- Do not use the product with wet hands. It can cause a dangerous electric shock.
- Do not attempt to use the product for the purposes other than those stated.

Usage Location

- If the products openings are exposed to conductive materials (solids or liquids), the product will short circuit and possibly create dangers of electric shock or fire. Please keep this product away from humidity, water, metallic debris or dust.
- Do not use this product near combustible gas as well as other flammable and/or explosive materials.
- Store the product out of direct sunlight.
- Do not use the product in an atmosphere that is dirty, where other machines are operated, or these is a high level of electromagnetic waves.
- Do not place the product on an unstable cart, stand or tripod as much usage creates danger of accidents and/or damage to product.

Maintenance and Storage

- If not using it for a long time, remove the USB cable from the product.
- The recommended temperature and humidity for equipment storage is 60-75F at 50% humidity.

User Service

- There are no parts that you can replace inside the product. Do not attempt replacing a part yourself. It can give you an electric shock.
- Do not attempt to open the case or repair yourself. It can cause an electric shock or other safety accidents.
- If the case is opened, all implied warranties and guarantee are made void.

Minimum System Requirements

To install and run 72-10155 USB, you should have the following.

Operating System

Windows ME/2000/XP/Vista 32bit & 64bit/Win7 32bit & 64bit

Memory

128Mbyte

Graphic Card

Microsoft DirectX supported

Screen resolution: 800x600

Color depth: 16bit

Hardware Specification

Acquisition	
Sample Mode	Real-Time Sample
Sample Rate	Real-Time Sample:100MSa/s
Average	N acquisitions, all channels simultaneously, N is selectable from 1-128.

Input	
Input Coupling	DC, AC, GND
Input Impedance	Resistance: 1MΩ; Capacitance: 25pF
Passive Probe Attenuation	10X
Supported Voltage Probe Attenuation Factors	1X, 10X
Maximum Input Voltage	35Vpk (DC + peak)

Horizontal	
Scanning Speed Range(Sec/Div)	4ns/div ~ 1h/div(1-2-4 sequences)
Sample Rate and Delay Time Accuracy	±50ppm(any interval ≥1ms)
Wave form Interpolation	Step, Linear, Sin(x)/x
Memory Depth(Sample Points)	10K: available all timebase 32K: 20us/div-400ms/div(Single channel); 40us/div-400ms/div(Dual channel); 64K: 40us/div-400ms/div

Vertical	
Analog Bandwidth	40MHz (-3dB)
A/D converter	8 bit resolution
Vertical Scale(Volt/div) Range	10mV ~ 5V/div @ x1 probe(1,2,5 sequence) 100mV ~ 50V/div @ x10 probe
Position Range	±4division
Selectable Analog Bandwidth Limit	20MHz
Lower Frequency Response(-3dB)	≤ 10Hz(at input BNC)
Rise Time at BNC(typical)	≤8.8ns
DC Gain Accuracy	±3%

Trigger	
Trigger Source	CH1, CH2, EXT
Trigger Mode	Auto, Normal and Single
Trigger Type	Edge trigger: Rising edge, Falling edge.
Trigger Sensitivity	0.02 div increments
Trigger Level Range	±4V
Trigger Level Accuracy	±4 division

Measurement		
Cursor	Amplitude difference between cursors (ΔV) Time difference between cursors (Δt) Reciprocal of Δt in Hertz (1/ Δt) (Cross, Trace, Horizontal, Vertical)	
Auto Measure	Voltage Measurement	Vp-p, Vmax, Vmin, Vmean, Vrms, Vamp, Vtop, Vbase, Vmid, Vcrms, Preshoot, Overshoot
	Time Measurement	Frequency, Period, Rise Time(10%~90%), Fall Time(10%~90%), Positive Width, Negative Width, Duty Cycle

Environmental		
Temperature	Operating: 0℃ to 40℃	
	Non-operating: -20℃ to +60℃	
Cooling Method	Forced air	
Humidity	Below +35℃, ≤90% relative humidity	
	+35℃ to +40℃, ≤60% relative humidity	
Altitude	Operating	3,000m or below
	Non-operating	15,000m or below

Mechanical		
Size	Width	190mm
	Height	100mm
	Depth	35mm
Heavy	Without package	0.29kg
	Packaged	0.9kg

Accessories	
	X1, X10 two passive probes. The passive probes have a 6MHz bandwidth(rated 100Vrms CATIII) when the switch is in the X1 position, and a maximum bandwidth(rated 300Vrms CATII) when the switch is in X10 position. Each probe consists of all neccessary fittings.
	A USB A-B line. Simply plug this cable's USB-B end into the device, and plug the two USB-A ends into open USB ports on one PC. This cable then pulls power from both USB port, and thus increases the output to the external drive. The red molded hood on the auxiliary USB-A connector enables the user to quickly distinguish between main and auxiliary power.
	A software installation CD and it also contains the user manual for Tenma oscilloscope.

Introduction

The Tenma 72-10155 is a portable PC-based digital oscilloscope.

High performance

The Tenma 72-10155 has the following features: 40MHz analog bandwidth, 100MHz real-time sampling.

USB connected

The Tenma 72-10155 uses USB that supports plug's play, with 12Mbp communication speed.

Best performance for your dollar

The Tenma 72-10155 has many features that are comparable to the high speed stand-alone Tenmas, but it costs a fraction of the price.

No external power required

The Tenma 72-10155 does not need an external power source, because it is bus-powered from USB.

Easy to use

The Tenma 72-10155 is easy to use. It is intuitive and easy to understand.

Big screen

You can change Tenma 72-10155 interface screen size as you need.

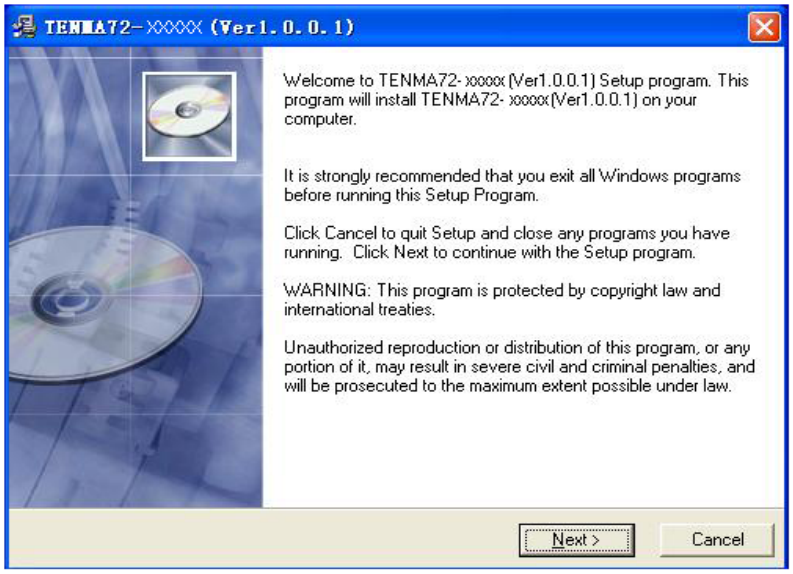
Various data format processing

The Tenma 72-10155 can save waveform in the following formats: text file, jpg/bmp graphic file, MS excel/word file.

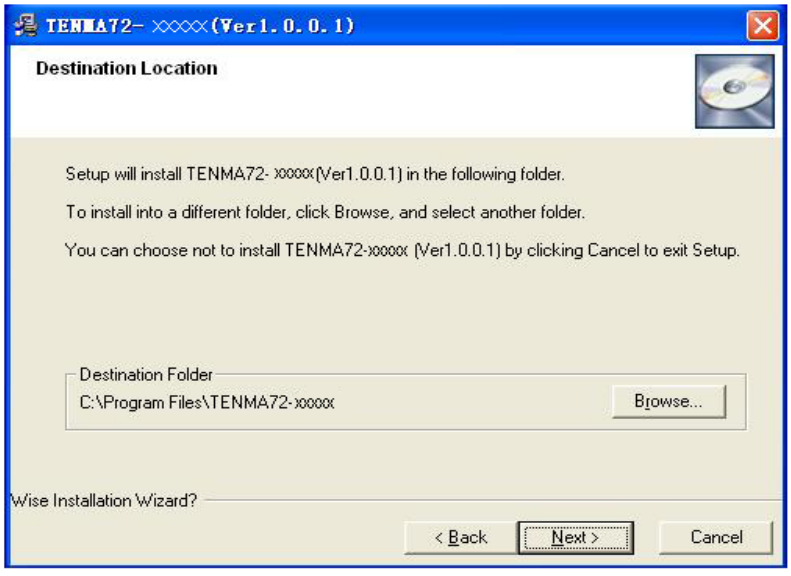
Software Installation

1. With the computer powered on, and Windows running, insert the installation CD into the CD-ROM drive.
2. The installation should start up automatically. Otherwise in Windows Explorer, switch to the CD-ROM drive and run " Setup.exe".

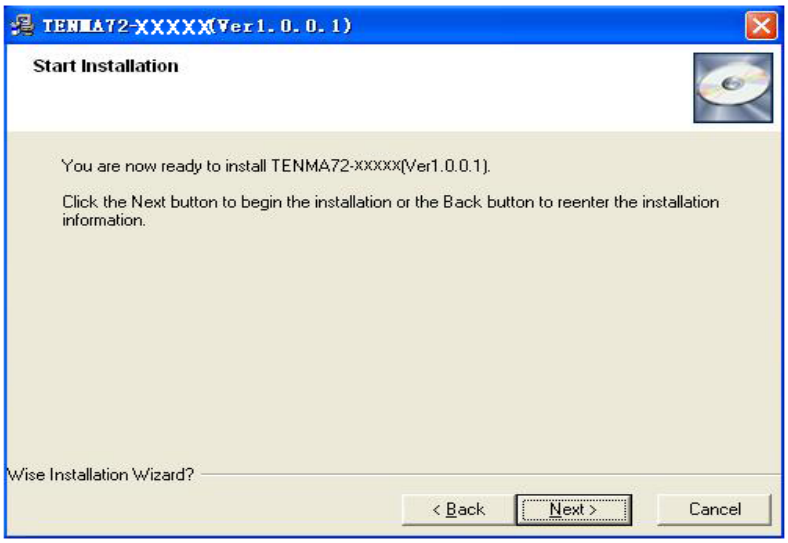
3. The 72-10155 installation is started. Click 'Next' to continue.


TENMA72-XXXXX (Ver1.0.0.1)
Welcome to TENMA72-XXXXX(Ver1.0.0.1) Setup program. This program will install TENMA72-XXXXX(Ver1.0.0.1) on your computer.
It is strongly recommended that you exit all Windows programs before running this Setup Program.
Click Cancel to quit Setup and close any programs you have running. Click Next to continue with the Setup program.
WARNING: This program is protected by copyright law and international treaties.
Unauthorized reproduction or distribution of this program, or any portion of it, may result in severe civil and criminal penalties, and will be prosecuted to the maximum extent possible under law.
Next >
Cancel

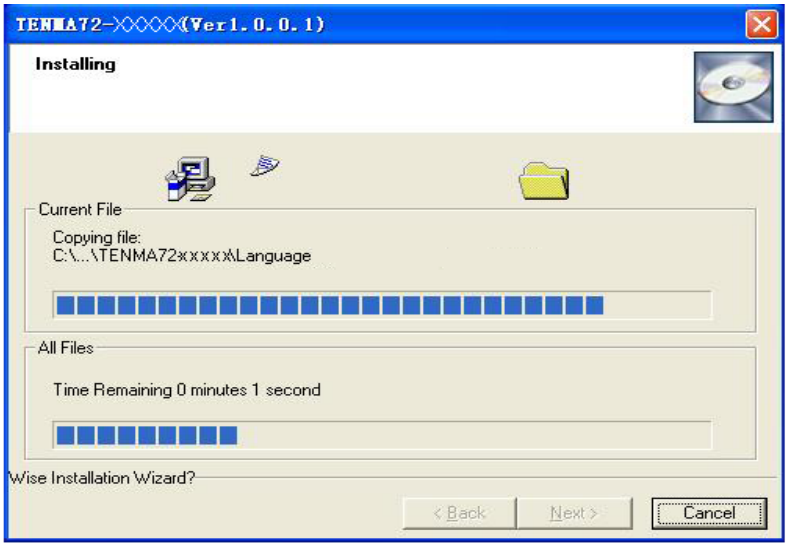
4. Choose a destination directory. Click 'Next' to continue.


TENMA72-XXXXX(Ver1.0.0.1)
Destination Location
Setup will install TENMA72-XXXXX(Ver1.0.0.1) in the following folder.
To install into a different folder, click Browse, and select another folder.
You can choose not to install TENMA72-XXXXX (Ver1.0.0.1) by clicking Cancel to exit Setup.
Destination Folder
C:\Program Files\TENMA72-XXXXX
Browse...
Wise Installation Wizard?
< Back
Next >
Cancel

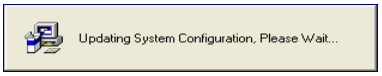
5. Check the setup information. Click 'Next' to start copying of files.


TENMA72-XXXXX(Ver1.0.0.1)
Start Installation
You are now ready to install TENMA72-xxxxx(Ver1.0.0.1).
Click the Next button to begin the installation or the Back button to reenter the installation information.
Wise Installation Wizard?
< Back
Next >
Cancel

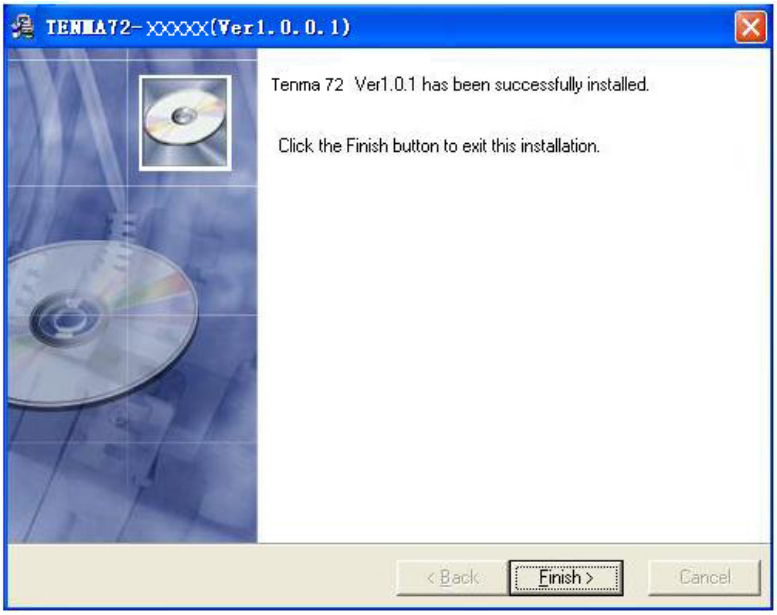
6. This status dialog is displayed during copying of files.



7. Updating your system configuration.



8. The installation is complete.


TENMA72-XXXXX(Ver1.0.0.1)
Tenma 72 Ver1.0.1 has been successfully installed.
Click the Finish button to exit this installation.
< Back
Finish >
Cancel

Hardware Setup

Black

1. Connect the A-Type Plug of USB cable to your PC's USB port.

2. Connect the B-Type Plug of USB cable to 72-10155's USB port.

3. New hardware is found.

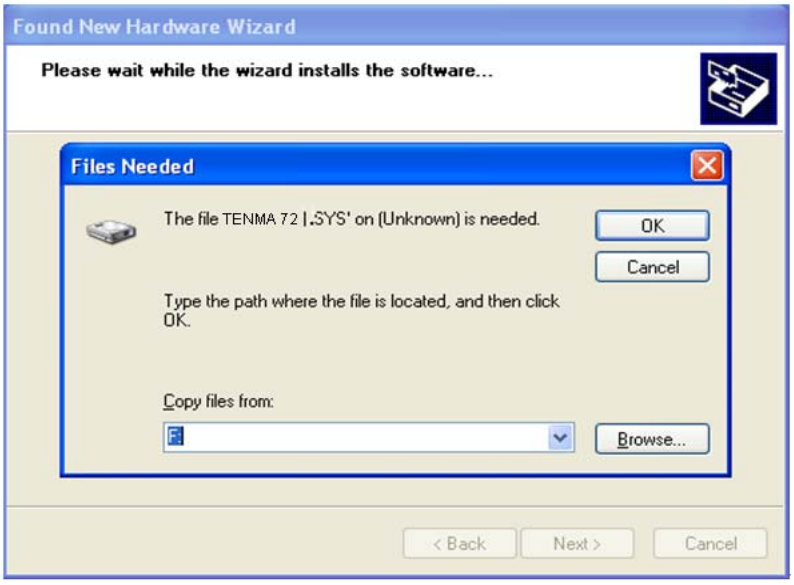
4. New hardware search wizard starts.

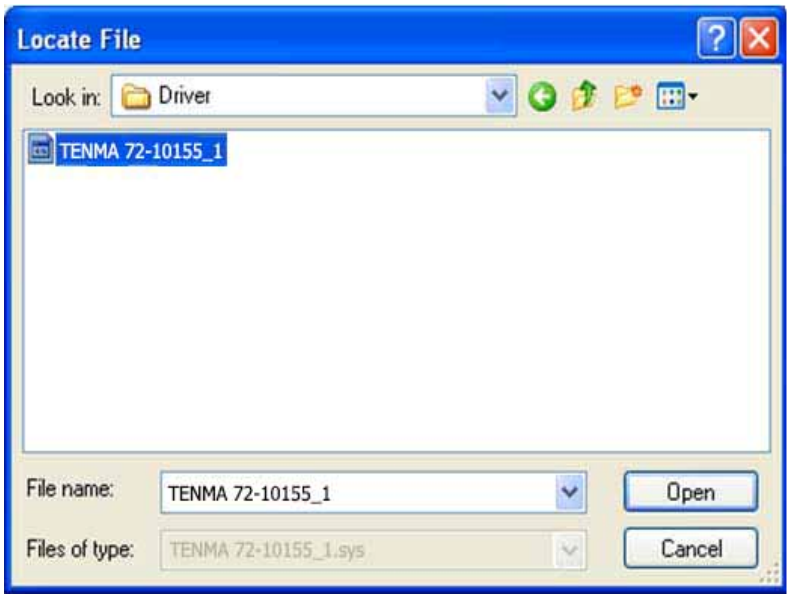
Found New Hardware Wizard
This wizard helps you install software for:
Tenma 72-xxxxx DERIVER 1
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

5. New hardware search wizard starts to search.

6. New hardware wizard installs software.

Found New Hardware Wizard
Please wait while the wizard installs the software...
TENMA 72-XXXXX USB DRIVER 1
Setting a system restore point and backing up old files in case your system needs to be restored in the future.
< Back
Next >
Cancel


Found New Hardware Wizard
Please wait while the wizard installs the software...
Files Needed
The file TENMA 72 I.SYS' on (Unknown) is needed.
OK
Cancel
Type the path where the file is located, and then click OK.
Copy files from:
Browse...
< Back
Next >
Cancel

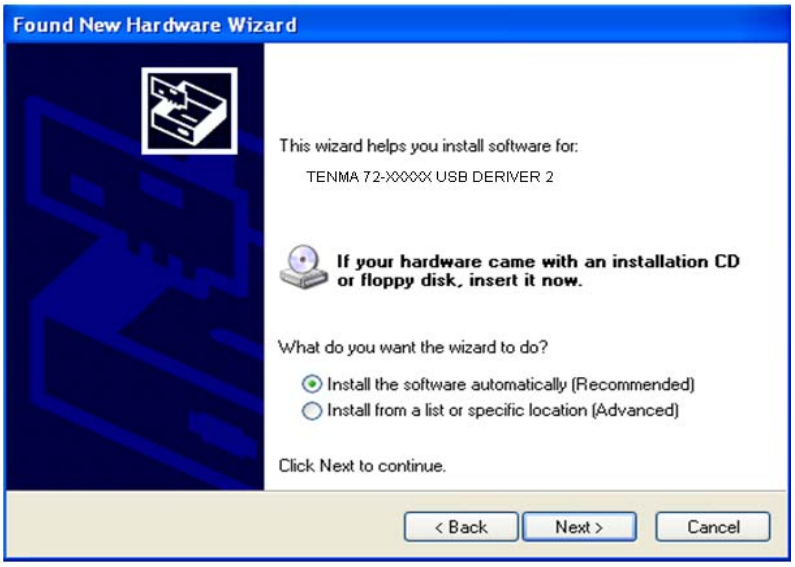


Found New Hardware Wizard
Please wait while the wizard installs the software...
TENMA 72-XXXXX USB DERIVER 1
Setting a system restore point and backing up old files in case your system needs to be restored in the future.
< Back
Next >
Cancel

7. Finish new hardware search wizard.

Found New Hardware Wizard
Completing the Found New Hardware Wizard
The wizard has finished installing the software for:
Tenma 72-xxxxx DERIVER 1
Click Finish to close the wizard.
< Back
Finish
Cancel

8. New hardware is found.


Found New Hardware Wizard
This wizard helps you install software for:
TENMA 72-XXXXX USB DERIVER 2
If your hardware came with an installation CD or floppy disk, insert it now.
What do you want the wizard to do?
Install the software automatically (Recommended)
Install from a list or specific location (Advanced)
Click Next to continue.
< Back
Next >
Cancel

9. New hardware search wizard starts to search.

10. New hardware search wizard starts to search.

Found New Hardware Wizard
Please wait while the wizard installs the software...
TENMA 72-XXXXX USB DERIVER 2
Setting a system restore point and backing up old files in case your system needs to be restored in the future.
< Back
Next >
Cancel

Found New Hardware Wizard
Please wait while the wizard installs the software...
TENMA 72-XXXXX USB DRIVER 2
Setting a system restore point and backing up old files in case your system needs to be restored in the future.
< Back
Next >
Cancel

11. New hardware wizard installs software and finish new hardware search wizard.

Found New Hardware Wizard
Completing the Found New Hardware Wizard
The wizard has finished installing the software for:
TENMA 72-XXXXX USB DERIVER 2
Click Finish to close the wizard.
< Back
Finish
Cancel

Setup Tenma 72-10155 USB.inf under windows 2000

When Tenma 72-10155 USB.inf file is not detected automatically, you see the following dialog box.

In this case you must install Tenma 72-10155 USB.inf file manually.

1. Choose 'Search for a suitable driver for my device' button. Click 'Next' to continue.
2. Specify a location. Click 'Next' to continue.
3. The Tenma 72-10155 USB.inf file is located in Tenma 72-10155 USB CD-ROM root directory. Specify the location by either entering or browing.
4. Tenma 72-10155 USB.inf file is detected automatically. Click 'Next' to continue.
5. Click 'Finish'.

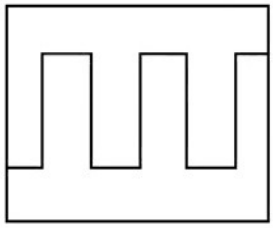
Probe Calibration

72-10155 Calibration

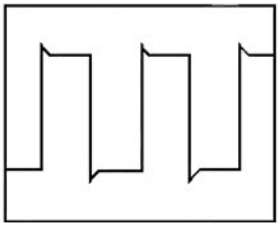
1. When manufactured, 72-10155 is calibrated manually to obtain maximum performance.
2. You may calibrate 72-10155 five or six months after purchase.

Probe Compensation

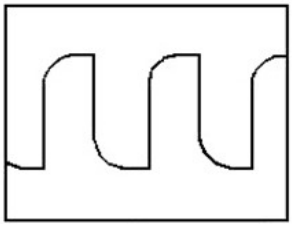
1. You must use a probe with more than 40MHz bandwidth to get undistorted signal.
2. Probe should be compensated whenever it is connected for the first time.
3. Connect calibration signal to channel 1, and then push 'AUTOSET'.
4. Check the shape of the displayed waveform.
5. Adjust the probe until the displayed waveform is compensated.



Correctly Compensated



Over compensated



Under compensated